



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/630,824	07/30/2003	Shin Aoki	RCOH-0096DIV	8147
21302	7590	12/15/2006	EXAMINER	
KNOBLE, YOSHIDA & DUNLEAVY EIGHT PENN CENTER SUITE 1350, 1628 JOHN F KENNEDY BLVD PHILADELPHIA, PA 19103			HENN, TIMOTHY J	
			ART UNIT	PAPER NUMBER
			2622	

DATE MAILED: 12/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	10/630,824		AOKI ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	Timothy J. Henn		2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 30 July 2003.
- 2a) ☐ This action is FINAL.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10, 12-22, 24 and 25 is/are rejected.
- 7) ☒ Claim(s) 11 and 24 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☒ Certified copies of the priority documents have been received in Application No. 09/001,094.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>7-24-06</u> | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Priority***

1. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. 09/004,151, filed on 07 January 1998.

### ***Claim Objections***

Claim 5 is objected to because of the following informalities, appropriate correction is required.

#### **[claim 5]**

Claim 5 includes the limitation of converting the color image data to RGB data using a predetermined matrix. However, claim 5 is dependant on claim 4 which claims that the color image data is already in a RGB format in step a. For the purposes of art rejection claim 5 will be read as depending on claim 1.

#### **[claims 11 and 23]**

Claims 11 and 23 claim an equation for  $Y_2$  and an equation

$$Y = Y_0 \text{ CCD1} + Y_1 C_r + Y_2 C_b$$

However,  $Y_2$  is not defined in the claim. For the purposes of art rejection,  $Y_2$  will be read as  $Y_2$ .

### ***Claim Rejections - 35 USC § 102***

Art Unit: 2622

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 13, 18 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Tse (US 5,477,345).

**[claim 1]**

Regarding claim 1, Tse discloses a method comprising: a) placing over a unit area a predetermined pattern of color-component specific filter elements on a single plane in a sensor, each of the color-component specific filter elements filtering a predetermined color-component over one of sub-unit areas in the unit area (Figure 2; R, G and B filters); b) sampling color image data for the unit area using the color-component specific filters (i.e. exposing the sensor to light and reading out image data from the sensor), a portion of the color image data being sampled only through a corresponding one of the color-component specific filter elements for a corresponding one of the sub-unit areas (The examiner notes that a R, G or B filter will inherently only allow red, green or blue light respectively to be sampled by the pixel it covers); c) generating chroma values for each of the color-component specific elements from the color image data (Figure 1, Chroma sub-sampler; c. 9, ll. 14-19); d) adjusting the chroma values (Figure 1, Gain correction); and estimating an intensity value based upon the adjusted chroma values and the color image data (Figure 1, Luminance Correction).

**[claim 13]**

Regarding claim 13, Tse discloses a system comprising: a single-plane color image sensor having a predetermined spatial pattern of color-component specific photo elements on a single plane for generating color image data (Figure 2), each of the color-component specific filter elements filtering a predetermined color-component over one of the sub-unit areas in a unit area, said single-plane color image sensor sampling the color image data for the unit area using the color-component specific filter elements, a portion of the color image data being sampled only through a corresponding one of the color-component specific filter elements for a corresponding one of the sub-unit areas (Figure 2; R, G and B filters will inherently only sample R, G and B light); an interpolated chroma value generator connected to the single-plane color image sensor for generating interpolated chroma values according to the spatial pattern (Figure 1, Chroma Sub-sampler; chroma values are averaged, c. 14, ll. 3-9); and an intensity estimator connected to the interpolated chroma value generator and the single-plane color image sensor for estimating an intensity value based upon the interpolated chroma values and the color image data (Figure 1, Luminance Correction).

**[claim 18]**

Regarding claim 18, Tse discloses a single-plane color image sensor which is two dimensional (Figure 2).

**[claim 19]**

Regarding claim 19, Tse discloses a single-plane color image sensor which is at least 3x3 of the color-component specific photo elements (Figure 2).

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 2 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tse (US 5,477,345) in view of Saito et al. (JP 07-093563).

**[claim 2]**

Regarding claim 2, Tse discloses further adjusting the chroma values (Figure 1, Offset correction) but does not disclose adjusting the intensity value for an improved edge characteristic after step e) or generating RGB data based upon the chroma values adjusted in step f) and the intensity value adjusted in step g). Saito discloses adjusting an intensity value to improve edge characteristics and converting the results to RGB color data (Figure 1). Saito discloses that this processes eliminates color slippage due to the deviation of the edge preparation in each color and that excellent high resolution can be prepared (Abstract). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the intensity for an improved edge characteristic and covert to the results to RGB as taught by Saito to output an image with reduced color slippage in a well known color image format (i.e. RGB) which would be compatible with further processing and display systems.

**[claim 25]**

Claim 25 includes the limitations of claims 1 and 2 which are disclosed by Tse in view of Saito as discussed above. Claim 26 further claims a program storage device readable machine tangibly embodying a program of instructions executable by the machine to perform the claimed steps. Official Notice is taken that the use of software to implement image processing steps and which is embodied on a computer readable medium is notoriously well known in the art as an easy method for creating image processing systems using general purpose processing elements instead of specially created application specific chips. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the method of Tse in view of Saito using software embodied on a computer readable medium.

6. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tse (US 5,477,345) in view of Saito et al. (JP 07-093563) in view of Murata et al. (US 5,333,055).

**[claim 3]**

Regarding claim 3, Tse in view of Saito lacks gamma converting the RGB data after step h). Murata discloses a step of gamma converting RGB data (Figure 5, Item 102). Such a step is advantageous in that it provides an output signal at an appropriate level to an output device. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a gamma-converting step as claimed to provide an output signal at an appropriate level to an output device.

Art Unit: 2622

7. Claims 4, 5, 7-10, 13, 14, 20-22 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tse (US 5,477,345) in view of Shimizu et al. (US 5,608,824).

**[claim 4]**

Regarding claim 4, Tse lacks a color image data which is in a RGB format in step a). Shimizu discloses the use of a RGB format as color image data (c. 22, ll. 10-13), such a color format is a standard in the industry and would thus be advantageous to use. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use color image data in a RGB format in step a) so as to obtain image data which is readily usable with other well-known conversions, filters, estimators and the like.

**[claim 5]**

Regarding claim 5, Tse lacks a first predetermined matrix for converting the color image data into a RGB data format. Shimizu discloses the step of converting color image data to RGB data format (c. 22, ll. 10-13). It is inherent to use such a predetermined matrix in this type of conversion, as information read pixel by pixel is subject to multiplication to convert to a RGB value.

**[claim 7]**

Regarding claim 7, Shimizu discloses a second predetermined matrix (c. 22, ll. 10-41). The matrix is used to convert RGB values to XYZ values that are then used to form chroma values. Such a predetermined matrix is needed in order to calculate the chroma values from the RGB values.

**[claim 8]**



Regarding claim 8, Tse in view of Shimizu lacks a combination of the first and second matrices into a third predetermined matrix. Official Notice is taken that matrix operations involving multiple matrices can be combined into a single operation by multiplying the matrices together to form a single transformation matrix. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make a third matrix corresponding to the first and second matrices to streamline the process by requiring only a single matrix operation instead of two separate matrix operations.

**[claim 9]**

Regarding claim 9, Tse lacks a predetermined filter used to adjust the chroma values in step c). Shimizu discloses such a filter (Figure 20, Item 219) which would be advantageous in that it can performing image processing functions such as local averaging, differentiation, edge-detection, extract particular frequency components of the input image and the like. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a predetermined filter for use in adjusting the chroma values in step c so as to extract particular frequency components for the chroma values.

**[claim 10]**

Regarding claim 10, Shimizu discloses the intensity has a range equal to all the color-component specific photo elements (c. 22, ll. 10-41). Shimizu discloses that RGB data is based on color image data read in pixel by pixel and that this information is used

in the XYZ conversion and the subsequent conversion to an intensity value.

**[claim 13]**

Regarding claim 13, Tse discloses the system of claim 13 but does not disclose a chroma value generator further comprising a color-component specific spatial filter for converting the chroma values. Shimizu discloses a spatial filter (Figure 20, Item 219) and a converter (Figure 2, Item 213). such devices would be useful in that they provide a more accurate chroma value and therefore a more accurate estimate of intensity. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a chroma value converter and a color-component specific spatial filter so as to obtain a more accurate chroma value.

**[claim 14]**

Regarding claim 14, Tse discloses the system of claim 13 but does not disclose a smoothing filter connected between the chroma generator and intensity estimator. Shimizu discloses a spatial filter (Figure 20, Item 219) and a converter (Figure 2, Item 213). such devices would be useful in that they provide a more accurate chroma value and therefore a more accurate estimate of intensity. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a chroma value converter and a smoothing filter so as to obtain a more accurate chroma value.

**[claim 20]**

Regarding claim 20, Shimizu discloses that the spatial filter (Figure 20, Item 219) can be used to extract a particular frequency component of the input image. It would

Art Unit: 2622

have been useful to use the spatial filter as a median filter so as to output a median value. Therefore, Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made include a median filter so as to filter out unwanted signals and consequently obtain a better intensity estimate.

**[claim 21]**

Regarding claim 20, Shimizu discloses that the spatial filter (Figure 20, Item 219) can be used to extract a particular frequency component of the input image. It would have been useful to use the spatial filter as a low-pass filter so as to output a low frequency signal so as to smooth the image data near edges. Therefore, Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made include a low-pass filter so as to filter out unwanted signals and consequently obtain a better intensity estimate.

**[claim 22]**

Regarding claim 22, Tse discloses the system in accordance with claim 12 but does not disclose that the intensity estimator estimates the intensity value in a range equal to all of the color-component specific photo elements. Shimizu discloses a spatial filter (Figure 20, Item 219) and a converter (Figure 20, Item 213). Such devices are useful in that they provide more accurate chroma value. Furthermore, the chroma values are found using the full range of the color-component specific photo elements. As such, the intensity estimator would estimate the intensity on the basis of the full range of color-component specific photo elements. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a

Art Unit: 2622

chroma value converter and a color-component specific spatial filter so as to obtain an intensity estimate based on the full range of color-component photo elements so as to provide a better intensity element.

**[claim 24]**

Regarding claim 24, Tse discloses the system in accordance with claim 12 but does not disclose an intensity estimator which estimates the intensity value in a range equal to all of the color-component specific photo elements. Shimizu discloses a spatial filter (Figure 20, Item 219), converter (Figure 20, Item 213), a parameter storage unit (Figure 20, Item 64-1) and a control unit (Figure 20, Items 220 and 65-1). Such devices are useful in that they provide a more accurate chroma value. Furthermore, such a device can be used for any number of other image processing functions. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a parameter storage unit and control unit so as to provide a more powerful image-processing system that obtains a higher accuracy of intensity value output.

8. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tse (US 5,477,345) in view of Shimizu et al. (US 5,608,824) in further view of Murata et al. (US 5,333,055).

**[claim 6]**

Regarding claim 6 Tse in view of Shimizu discloses the system of claim 5, however they do not disclose the step of gamma converting the RGB data output by the

Art Unit: 2622

system. Murata discloses the step of gamma correcting RGV data (Figure 5, Item 102). Such correction is advantageous in that it provides an output signal appropriate to the output device. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a gamma-converting step so as to provide an appropriate output signal.

9. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tse (US 5,477,345) in view of Shimizu et al. (US 5,608,824) in view of Saito et al. (JP 07-093563).

**[claim 15]**

Regarding claim 15, Tse in view of Shimizu disclose the system of claim 14, however they do not disclose an edge enhancement filter connected to the intensity estimator for enhancing an edge. Saito discloses such a system (Figure 1, Item 2) which is advantageous in that it results in a sharper image. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include an edge enhancement filter connected to the intensity estimator to obtain a sharper image.

**[claim 16]**

Regarding claim 16, Saito discloses that the output of the edge enhancement filter and the chroma signals (output by the smoothing filter of Shimizu) would be converted to RGB signals (Figure 1, Item 4). Such a conversion would be advantageous as it is a common format used in image display devices. Therefore, it

Art Unit: 2622

would have been obvious to one of ordinary skill in the art at the time the invention was made to include an RGB converter so as to convert the intensity and chroma values to a RGB format which is commonly used by display devices.

10. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tse (US 5,477,345) in view of Applicant's Admitted Prior Art (AAPA).

**[claim 17]**

Regarding claim 17, Tse discloses a single plane image sensor which is two dimensional. AAPA discloses that one dimensional image sensors and two dimensional image sensors can both be used image imaging systems (p. 1). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a one dimensional image sensor instead of a two dimensional image sensor in the system as an art recognized equivalent.

***Double Patenting***

11. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

Art Unit: 2622

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

12. Claims 11 and 23 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 and 8 of U.S. Patent No. 6,628,327. Although the conflicting claims are not identical, they are not patentably distinct from each other because:

**[claims 11 and 23]**

Claims 11 and 23 of the present application claim a method and system for improving color image data including steps of generating chroma values (claim 1, step b) of '327; claim 8, "interpolated chroma value generator" of '327), adjusting the chroma values (claim 1, step c) of '327; claim 8, "interpolated chroma value generator of '327), estimating an intensity value (claim 1, step d) of '327; claim 8, "intensity estimator" of '327). However, the '327 patent does not claim filtering a predetermined color-component over sub-unit areas in a unit area wherein a single plain color image sensor samples color image data for the unit area using the color-component specific filter elements and a portion of the color image data is only sampled through a corresponding one of the color-component specific filter elements. However, it is notoriously well known in the art to provide single-plane image sensor elements with color filters corresponding to individual colors (e.g. R, G and B) covering sub-unit areas (i.e. pixels) of the image sensor area to capture color image data. Therefore, it would have been

obvious to one of ordinary skill in the art at the time the invention was made to use a color image sensor including color filters corresponding to individual colors such as R, G and B to capture the color image data of the system and method claimed in the '327 patent.

***Allowable Subject Matter***

13. Claims 11 and 23 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

**[claims 11 and 23]**

Regarding claims 11 and 23, the prior art does not teach or fairly suggest an imaging system or method which estimates an intensity value using the claimed equations. The examiner notes that although the prior art does not teach or suggest the limitations of claims 11 and 23, the double patenting rejection based on the '327 patent must be overcome before these claims can be passed to issue.

***Conclusion***

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- |     |              |              |
|-----|--------------|--------------|
| i.  | Hieda et al. | US 5,548,330 |
| ii. | Glenn        | US 4,721,998 |



Art Unit: 2622

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy J. Henn whose telephone number is (571) 272-7310. The examiner can normally be reached on M-F 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vivek Srivastava can be reached on (571) 272-7304. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TJH  
12/6/2006



VIVEK SRIVASTAVA  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2600